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Consumption and Saving Behaviour: Modelling Recent Trends

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Abstract

This paper illustrates recent trends in household consumption and personal savings in the UK and the US and discusses some theoretical models that can be used to interpret them. The trends in these two countries are interesting for several reasons. The decline in personal saving rates in the US during the 1980s is an unresolved puzzle. The corresponding variable in the UK has undergone large fluctuations, as have several other variables ranging from projected demographic trends to female labour supply. This paper stresses the need to analyse individual data to shed some light on these aggregate trends. It also stresses the need to have a sound structural model to interpret observed patterns in the data.

The theoretical framework discussed throughout the paper is the life-cycle model, which views consumption and saving decisions as part of a dynamic optimisation process. The development of the model and the current research agenda and ways that it can be enriched with various degrees of sophistication are discussed. Particular attention is devoted to the discussion of the most recent developments.

JEL classification: D1, E21.

I. INTRODUCTION

In this lecture, I will talk about some recent work on consumption and saving behaviour. In doing so, I will draw liberally from studies that I have done with

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several co-authors[1] and from some research that is currently in progress. As you will soon realise, a big part of the talk is an admission of ignorance. I wish I could offer more precise answers to the questions I will consider. Often I will point out the problems with some of the answers that have been proposed in the literature, but I will fall short of providing a convincing alternative. On the other hand, and on a more positive note, I am convinced that we have made substantial progress in understanding household behaviour and that we have a methodology that can be applied consistently to understand recent trends. There is a lot of work to be done and I will indicate some of the directions that, in my opinion, the research on consumption and saving behaviour should pursue.

A few years ago, I started a paper on the decline of the personal saving rate in the US with a quote from *Farewell, My Lovely* by Raymond Chandler. The quote was a conversation between the private eye Marlowe and a detective who had just presented a fairly elaborate, if unconvincing, theory about a murder case. Confronted with Marlowe's scepticism, he replies: 'I was just trying it out. It fits the facts, as far as we know them. Which is not far'. Marlowe's response to this can be applied to many of the explanations of the decline in saving in the US and other countries: 'We do not know enough to even start theorizing'.

While I still have some sympathy for Marlowe's argument and I am convinced that we do not know much about individual saving behaviour, I have also become convinced that good economic theory can and should constitute an invaluable instrument for a better understanding of the 'facts' that we observe. One of the main themes of this lecture is going to be the necessity to overcome the dichotomy between structural models of household behaviour and descriptive analysis of data.

In this lecture, I will focus on two countries that have experienced fundamental changes and whose saving behaviour has diverged considerably: the US and the UK. The reason for this choice is partly because I have studied them extensively (and have lived in both of them) and partly because I think they constitute good 'case studies' whose experience can be useful to understand what has happened in other countries.

Figure 1 reports the aggregate personal saving rate in the US and in the UK.[2] In the last two decades, the saving rate in the US (and in many other developed

[1]In particular, James Banks (Institute for Fiscal Studies), Martin Browning (McMaster), Tom MaCurdy (Stanford), Costas Meghir (UCL and IFS) and Guglielmo Weber (University of Venice and IFS).

[2]The definition of personal saving rate is not completely obvious. There are several difficult definitional issues. One of the most important is whether to include pension and social security (National Insurance in the UK) contributions in saving or treat them as taxes. In addition, one might want to consider pension income as decumulation of pension wealth. Finally, several researchers have advocated the correction of income figures for the effect that inflation has on nominally denominated assets. The data reported in Figure 1 treat pension and social security contributions as saving and do not correct for inflation. While I recognise the importance of these issues, their treatment does not make a huge difference to the main trends that I want to stress here. One should also consider the issue of what definition of saving (personal or national) is the most appropriate. I have chosen to use personal saving exclusively, for comparability with the individual data discussed below.

FIGURE 1

Personal Saving Rates

Sources: *Economic Trends*; *Economic Report to the President*.

countries) has declined considerably. It was around 9 per cent in 1981 and has plummeted to around 4 per cent in the early 1990s. The changes in the personal saving rate have been reflected, to a large extent, in changes in the national saving rate.

The fluctuations in the aggregate personal saving rate in the UK have been quite different. The decline of the late 1980s, related to the consumption boom of 1987 and 1988, has been followed by a considerable increase in the early 1990s. I know of no convincing explanation for the decline in the personal saving rate in the US nor for the fluctuations in it in the UK, although many hypotheses have been proposed. Economists have been quite good at rejecting many of them. However, the success on the positive side has not been great.

Many things in the economic environment in which households operate have changed in the last 20 years. Average family size has decreased considerably, as a consequence of both reduced fertility and the increase in the number of single households. Female participation in the labour force has increased dramatically. Both in the US and (in particular) in the UK, financial markets have grown tremendously. Households have a much wider and more generalised access to financial markets where a larger range of products are now available. This and the much greater ability to borrow are likely to have important implications for consumption and saving behaviour. The prices of several assets, and in particular of real estate, have fluctuated dramatically and it has been suggested that this has had a strong effect on consumption. The 1980s have witnessed, both in the UK and in the US, a marked increase in income inequality, related to the increase in

the return to education and skill.[3] This might have important implications for individual and aggregate consumption, especially if these changes are linked to changes in the level of uncertainty faced by individual households. Can any of these developments explain completely the observed changes? The answer is probably no for many of them and a qualified maybe for others.

Why should we care about the decline in saving rates? It is a popular view that low saving rates are somehow 'bad'. It is not easy to find a completely convincing explanation for this view. Some people would appeal to a possible link between saving rates and growth. And yet one of the most famous and elegant models of growth — Solow's model — shows that, in the long run, such a relationship does not exist. While recent endogenous growth models have changed our attitude towards growth, there is no consensus, either theoretically or empirically, on the existence of a causal link between saving and growth.

An alternative, and possibly more interesting, argument to justify the worries about the dynamics of aggregate saving rates concerns the adequacy of the personal (and national) saving rate to provide for the retirement of the individuals who are currently working.

Most developed countries are ageing considerably. This process is due to the increase in life expectancy combined with a decline in fertility. As a consequence, the dependency ratio (i.e. the ratio of the number of individuals over the age of 65 to the number of individuals of working age) is projected to increase dramatically in most countries. Figure 2 plots some of these projections for three countries. The combination of the projected demographic trends and of unfunded pension (social security) systems creates a potentially worrisome situation. Most unfunded (pay-as-you-go) systems are projected to be unsustainable unless there are massive and often unrealistic increases in the rate of taxation in the future. To the liabilities of the public pension system one should add the projected health costs of an ageing population with considerably longer life expectancy.

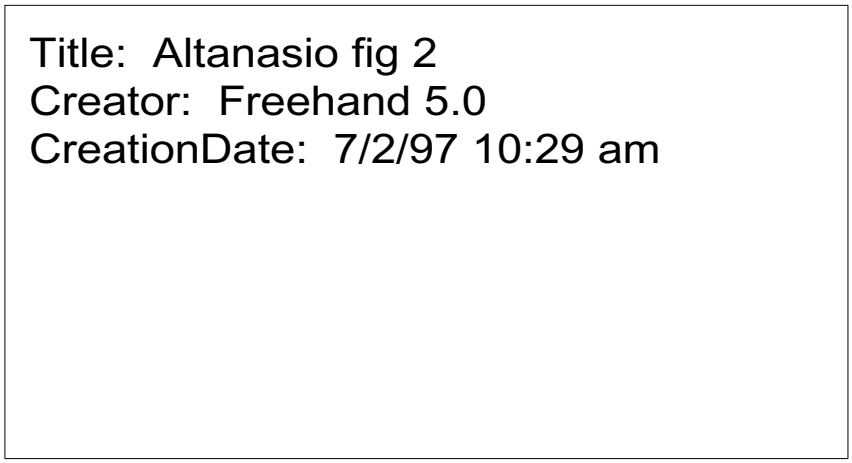
With respect to the sustainability of the pension system, the US and the UK constitute two very interesting examples. In the US, the pension system is substantially unfunded, even though there are many discussions about its reform, while the UK has substantially completed the transition to a system whose unfunded component becomes progressively less important and is projected to constitute a small fraction of future pension income.

If the generation currently working cannot rely on the state to provide for its retirement by taxing future workers, it becomes crucial to understand whether personal savings are being accumulated at an adequate rate. An answer to this question, however, can only be given if individual behaviour is studied in all its

[3]For the US, see Juhn, Murphy and Pierce (1993); for the UK, see Gosling, Machin and Meghir (1996). The increase in wage inequality was also reflected in expenditure inequality. For the US, see Attanasio and Davis (1996); for the UK, see Goodman, Johnson and Webb (1997).

FIGURE 2

Age Dependency Ratios
(number aged over 65 / number aged 15–64)



Source: OECD.

aspects. Recent data might look worrying, especially in the US. Data from the 1992 Current Population Survey (CPS), shown in Table 1, indicate that among individuals older than 65, less than half had some pension income and that the proportion of income derived from pensions was only about a fifth. The figures are particularly low for single people. Pensions include government pensions but exclude social security. The percentages of households receiving some purely private pension income are even lower. This income constituted only about a tenth of total income for these elderly individuals. Most households, on the other hand, receive social security income. The particularly low number of single people

TABLE 1

Pension Coverage of Households Headed by Individuals Older than 65

Per cent

	All households	*Single people*
Percentage covered by pension (excluding social security)	45.0	36.0
Percentage of total income coming from pensions	19.8	17.8
Percentage covered by private pensions	32.0	24.0
Percentage of total income coming from private pensions	10.2	9.3

Note: In the US, social security payments are the state pensions. Social security contributions are equivalent to National Insurance contributions in the UK.
Source: Current Population Survey, 1992.

covered by pensions (public or private) is explained by widows who did not participate in the labour force and whose husbands might have had a pension that did not cover survivors. If one projects these numbers to a situation in which the social security system is unsustainable and potentially bankrupt, there are good reasons to be worried. A moment's reflection, however, makes it clear that these numbers cannot be projected to the future. The individuals currently retired, especially women, had very different labour force behaviour from those currently working. Private pension coverage was also much less widespread in the generation currently retired than in the cohort currently working.

This does not mean that there is nothing to worry about. However, it is crucial to understand how the process of accumulation of personal wealth is affected by labour market experience, fertility choices, the availability of different financial instruments and assets, fiscal incentives (or disincentives), life expectancy and so on.[4] Furthermore, we need to understand what happens to consumption patterns when people retire and whether the drop in consumption that is observed in most datasets is consistent with intertemporal optimisation. (See, for instance, Banks, Blundell and Tanner (1996).)

The generation of individuals who are now around 40, and therefore in the middle of their working life, is unique in many respects. First, it is a particularly large generation. This is what is usually referred to as the 'baby-boom' generation. Second, as I have already mentioned, they are not having many children. Third, the labour supply behaviour of the baby-boom generation is very different, especially for females. Female labour force participation has constantly increased over the last 20 years, as shown by Figure 3, which plots the ratio of female to male labour force participation rates for a selection of countries. The life-cycle pattern of female labour force participation has also changed dramatically, as shown in Figure 4, which plots the female labour force participation rate by age in the US in 1972–73 and for an average of the 1982–92 Consumer Expenditure Surveys. In the US until 20 years ago, there was a very visible dip in the female participation rate around the most fertile ages, but this is no longer present. As discussed below, the increase in female labour force participation has potentially very important consequences for saving behaviour and is obviously also linked to changes in fertility. Fourth, the baby-boom generation is probably the first not to have experienced a major war or a period of generalised economic hardship (such as the Great Depression). This has probably changed attitudes to saving, borrowing and consumption.

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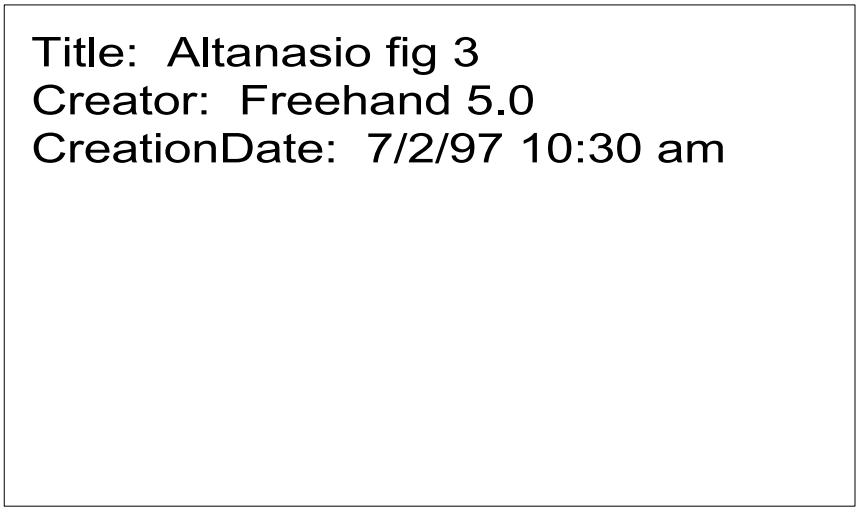
[4]It is crucial to understand how the provision of public pensions affects saving behaviour. While the comparison between individuals with different entitlements could be informative, it may be affected by other differences between the same individuals. It might be more interesting to consider changes in legislation that affect pension entitlements differently for different groups and study the changes in consumption behaviour that result. I have used this approach in a paper co-authored with Agar Brugiavini (Attanasio and Brugiavini, 1996).

FIGURE 3

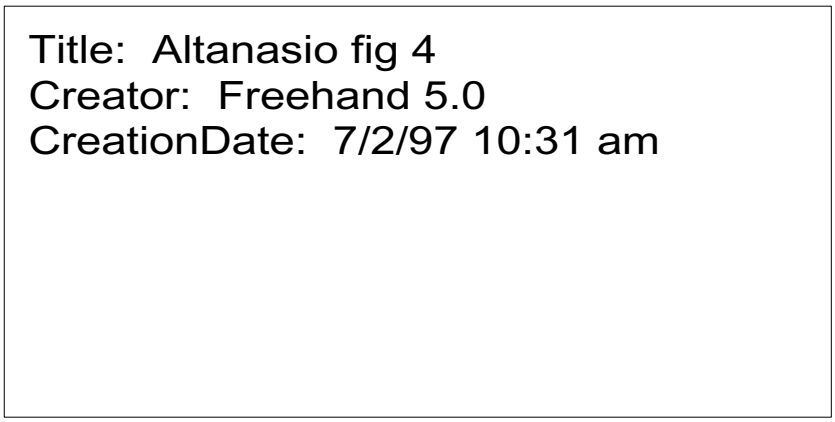
Total Female Labour Force Participation / Total Male Labour Force Participation



Source: OECD.

FIGURE 4

Female Labour Force Participation Rates in the US, by Age



Source: Consumer Expenditure Surveys.

With respect to the sustainability of public pension systems and the adequacy of private savings, I would like to make a small digression about an issue which I will not discuss in depth, even though it is, in my opinion, extremely important. In reading the comments on the sustainability of alternative pension systems, one often gets the impression that fully funded systems are the answer to the current

demographic trends. One problem with this argument is that it takes the rate of return as a given. Demographic trends and the massive changes to the composition of the population are bound to have an effect on asset prices and therefore on the expected returns on the assets of the baby-boom generation. When the baby boomers retire and start cashing in their assets, being stocks or houses, the chances are that, given that there will not be many people to buy them, prices will go down. Obviously, this would be a real concern for a closed economy. One could think that the UK has access to an international capital market where claims to domestic assets could be sold. However, given that most of the industrialised world has similar demographic trends, this is likely to be a problem. The study of these issues is very difficult as it involves general equilibrium considerations and a number of problems that range from factor mobility to immigration to political economy. Even the development of Third World countries and the relationship between developed and developing economies are important for these problems. Economists have a very full and exciting research agenda ahead of them.

The rest of this paper is organised as follows. I begin, in Section II, by discussing a theoretical framework we can use to analyse saving behaviour. I then illustrate, in Section III, some of the facts that are important for household saving. In that section, I also have a closer look at individual behaviour and suggest a strategy to analyse it. Section IV concludes.

II. MODELS

The theoretical framework that many economists would use to analyse saving and consumption decisions is some version of the life-cycle model. In my opinion, the main attractiveness of this model is that it considers saving as a decision about the intertemporal allocation of resources and uses a theoretical construct substantially similar to that used to study the allocation of a given amount of expenditure among different commodities. It is a coherent and flexible framework that can incorporate a large number of realistic features and lends itself naturally to empirical analysis.

Different researchers have different opinions on the particular formulation of the model to be used and, related to that, on the main motivation for saving. In this respect, my use of the term ‘life-cycle model’ is quite loose and a bit unconventional: some people would think of the life-cycle model as little more than the classroom example in which a single consumer smooths out predictable (and exogenous) fluctuations in income in order to keep the (discounted) marginal utility of consumption constant. In such a framework, summarised by the classic textbook picture of a flat consumption profile and a ‘hump-shaped’ income profile, the main motivation for saving is to provide retirement income. Instead, when I refer to the ‘life-cycle model’, I have in mind a much more general framework — that is, a situation in which a decision unit maximises expected utility in a dynamic and possibly uncertain environment. The decision unit is likely

to be a household rather than an individual and consumption is not the only choice variable: labour force participation decisions as well as decisions about the composition of consumption expenditure are likely to be taken simultaneously with consumption and saving decisions. In such a situation, income is endogenous (because of labour supply behaviour), family composition is an important component of consumption decisions and only under stringent conditions can saving be determined independently of the composition of demand. Furthermore, because of uncertainty, the precautionary motive for saving might be important. That is to say that savings are accumulated to provide a buffer against unexpected fluctuations in income.

The classroom version of the model is obviously inadequate, but it provides an extremely useful theoretical framework which can incorporate all of the features mentioned, and many more, without losing its empirical tractability. Which of the motivations for saving implied by the various features of the model turn out to be important is largely an empirical matter.

One of the strongest hypotheses of the classroom version of the model is that individuals are able to borrow at the same rates at which they can lend. This assumption has captured the imagination of many researchers, who have pointed out that in the presence of borrowing restrictions, or even of differences between borrowing and lending rates, some of the implications of the model will not be relevant. It should be stressed, however, that even in the presence of borrowing restrictions,[5] households do not consume, as is sometimes suggested, a fixed proportion of their disposable income. This would happen only when the restriction is actually binding. Only recently have researchers started to model the behaviour of liquidity-constrained individuals explicitly and within the same maximisation framework considered by the life-cycle model. Deaton's (1991) paper is an important example of this literature.

The life-cycle model was developed in the 1950s, along with the permanent income hypothesis, partly as a response to the empirical and theoretical problems presented by the Keynesian consumption function. After the initial debate on the plausibility of the model and first empirical studies, which looked at both time-series and cross-sectional data, the main development was the rigorous incorporation of uncertainty in the model. If one assumes that economic agents maximise expected utility in a dynamic context, the optimisation problem becomes extremely complicated, and consumption and saving decisions depend not only on current variables but on expectations (and higher moments) of future variables. Two problems are evident: first, it is in general impossible to derive closed form solutions for consumption; second, even if these were available (as they are under restrictive assumptions), we do not have data on expectations.

The elegant solution to this problem is in the work of MaCurdy (1981) (in the context of a labour supply problem) and Hall (1978). The main idea was to

[5]Borrowing restrictions are often referred to as liquidity constraints.

circumvent the need for a closed form solution for consumption and exploit the main implications of the maximisation problems that economic agents are assumed to solve. Optimal behaviour implies that the (discounted value) of the marginal utility of consumption expenditure is equalised across periods. This is what is known in the literature as an Euler equation. By considering this equation, the profession has been able to work with models that have testable empirical implications and whose structural parameters can be estimated. The beauty of this approach is that one can focus on a particular problem and control rigorously for a number of important factors that are bound to be relevant and that would be extremely difficult to model explicitly, without losing empirical tractability. For instance, in modelling non-durable consumption expenditure, one can easily allow for endogenous labour supply, fertility choices, durable consumption affected by transaction costs, human capital accumulation, housing tenure choices and so on.

Since Hall's 1978 study, many papers have used this fundamental insight. It has also become clear that the same problem has strong implications for financial economics and, in particular, for asset pricing: saving and portfolio allocation decisions are obviously related to, and, in equilibrium, are important determinants of, asset prices.

The result of this big empirical effort cannot be described as successful. On the asset pricing side, the problems became apparent quite soon: if one uses the marginal rate of substitution between future and present consumption to determine equilibrium rates of return, one is confronted with the empirical fact that the latter are extremely volatile and differ substantially across assets, while the former is substantially smoother, at least for sensible values of the parameters. It has been recently pointed out that the degree of curvature of the utility function required to justify some features of asset returns would imply that people are so risk-averse that they would never get out of bed in the morning! It is my opinion that asset price behaviour can only be explained by models that involve some sort of friction which might break the link between the marginal utility of consumption and asset returns. A model like the one proposed by Grossman and Laroque (1990) introduces transaction costs into the picture and, in my opinion, goes in the right direction. In addition, asset price models will have to deal explicitly with agents' heterogeneity and will have to explain the limited amount of diversification that the few empirical studies in this area seem to find. Successful models should also account for the limited (active) participation in financial markets: it might be the case that the consumption of only a subset of the population is relevant for asset prices![6]

From the point of consumption and saving behaviour, there is no strong consensus in the literature on the success of the life-cycle model. Many empirical studies of consumption and the life-cycle model have used aggregate data under the assumption of a representative consumer and have focused on tests of the over-

[6]It might also be the case that participants in financial markets are characterised by different attitudes towards risk.

identifying restrictions implied by the optimisation problem.[7] It is my opinion, which I have expressed in a number of papers, that aggregation problems are too serious to be able to learn anything about structural parameters and models from aggregate data.[8] The only justification for the use of aggregate data to estimate or test a structural model of consumption is the fact that micro-datasets containing consumption information are few and far between. Such a justification, however, resembles that of the famous drunk looking for his house keys under the lamppost.

Many of the early studies that have used microeconomic data have focused on simple tests of this model and in particular on the proposition that expected consumption and income growth should not be correlated. Several authors have interpreted the presence of such a correlation as a failure of the model and as an indication of borrowing restrictions that force at least a part of the population to consume their disposable income.[9] I think that the questions in these papers are ill-posed. There are several reasons why consumption and income growth can be correlated even if the life-cycle model holds. In some of my work, my co-authors and I have stressed the role that demographic variables, as well as the endogeneity of labour supply, can play.[10] And these are not new arguments: in 1974, James Heckman stressed similar points in an exchange with Lester Thurow![11]

In general, it is very difficult to distinguish between hypotheses on preferences and hypotheses on opportunity sets. This is particularly true for the problem at hand in which, even in the presence of borrowing restrictions, the conditions implied by the intertemporal maximisation problem are violated only rarely and only for some individuals.

My reading of the empirical evidence is that it is, in general, possible to construct a version of the life-cycle model, incorporating uncertainty, non-separabilities with labour supply, an important role for demographic variables and possibly multiple commodities, that fits the available data. This is one of the messages contained in several of my papers, as well as in the work of others.[12] One can also estimate some important behavioural parameters of this model, such as the elasticity of intertemporal substitution, and some of the parameters that affect within-period choices, such as the marginal rate of substitution between consumption and leisure.

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[7] See, for instance, Hall (1978), Hansen and Singleton (1982 and 1983) and Flavin (1981).

[8] See, for instance, Attanasio and Weber (1993) and Blundell, Pashardes and Weber (1993).

[9] See, for instance, Hall and Mishkin (1982), Zeldes (1989) and Runkle (1991). Many of these papers, in addition, used data from the US Panel Survey of Income Dynamics, which contains only information on food consumption. In Attanasio and Weber (1995), we show that the use of food consumption can be misleading.

[10] See Attanasio and Weber (1993 and 1995) and Attanasio and Banks (1996).

[11] See Thurow (1969) and Heckman (1974).

[12] See Attanasio and Weber (1989, 1993 and 1995), Blundell, Browning and Meghir (1994), Banks, Blundell and Preston (1994), Attanasio and Browning (1995), Attanasio (1995) and Attanasio, Banks, Meghir and Weber (1995).

Having said this, however, we have to pause and ask ourselves 'what is the cost that is paid to circumvent the unobservability of the marginal utility of wealth?' and, indirectly, 'what is the usefulness of fitting an Euler equation to the data?'.

The main problem of the Euler equation approach is that one loses the ability to say anything about the *levels* of consumption and, therefore, saving. The Euler equation is only informative about consumption changes over time. We cannot answer many of the most important questions that policymakers ask, such as 'what is the effect of a tax incentive on saving?', 'what is its effect on labour supply?' and 'what is the effect of the development of financial markets or changes in family composition on consumption?'.

It is true that the fitting of Euler equations can provide estimates of the structural parameters that constitute important pieces of the answers to the questions just mentioned. It will be possible, for instance, to assess the size of the elasticity of intertemporal substitution — that is to say, how easy individuals find it to substitute consumption over time. The size of this elasticity is important, for instance, in determining the effect of changes in relative prices on saving, or in determining the dead-weight loss of public debt. It is important to stress that these estimates can be obtained in a rigorous fashion — that is, without ignoring the endogeneity of many of the variables that affect individual choices, such as labour supply, fertility and so on. It is also possible to estimate the parameters that govern the allocation of resources within one period. These parameters are important to the study of the pattern of demand systems (which are important for a variety of issues, such as indirect taxation) as well as labour supply.[13]

We can also test the specification of the model we use and check whether it is consistent with intertemporal optimisation. An important application of this test, for instance, is to address the issue of the adequacy of retirement saving. To understand whether current saving is 'adequate', we have to establish what level of consumption future retired people should sustain. It is therefore important to determine whether the decline in consumption observed in many datasets is rationalised within an intertemporal optimisation framework. Banks, Blundell and Tanner (1996) have written what I think is an important paper on this issue.

Having listed some of the possible applications of structural models of consumption, I need to stress again that these models are still not capable of answering a large number of important questions. In particular, the Euler equation approach is uninformative about the way in which consumption adapts to unexpected changes in the economic environment.

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[13]In a recent paper (Attanasio and MaCurdy, 1996), Tom MaCurdy and I analyse consumption and household labour supply choices. We use the estimates of our structural parameters to evaluate the compensated and uncompensated wage elasticity of male and female labour supply. In that study, we use our results to assess the effects of the Earned Income Tax Credit in the US.

Parallel to the literature on the structural estimation of consumption and saving models, there is a large literature on saving that is of a different nature. These are studies of the decline in savings or of the effect of fiscal incentives on savings. It is astonishing that, with few exceptions, the papers that study structural models of consumption typically do not even cite the descriptive studies of savings and vice versa! In my view, the profession has been, for the most part, schizophrenic. The main reason for this separation lies in the fact that structural models have little to say about consumption and saving levels, while it is very difficult to give a structural interpretation to the trends and facts reported in the more descriptive literature.

Having contributed to both literatures, I find this dichotomy very frustrating. I do think it is essential for researchers working on structural models to accept the challenge of going beyond the Euler equation approach. The estimation and testing of the structural life-cycle model is useful and interesting but it risks becoming a sterile and abstract exercise. The problem with a purely descriptive approach, on the other hand, is that it is unable to answer some of the most important questions. One of the best examples of this impasse is, I think, the literature on tax incentives to saving in the US. There are a large number of papers that discuss whether the fiscal privileges enjoyed in the mid-1980s by contributors to Individual Retirement Accounts (IRAs) and subsequently by 401(k) participants in the US have helped in stimulating saving (or have avoided a further decline). The discussions between those who claim that such plans have been useless and costly for the government and those who swear by their usefulness have grown increasingly bitter. And yet, without a rigorous structural model, I do not think it is possible to solve the question of whether such schemes have simply caused the reshuffling of existing assets or have stimulated new savings. The available evidence (contributors to IRAs and 401(k) do save more and contributions to the schemes have increased) cannot give an answer to this question without a more complete model of behaviour.

What is the direction that structural models can take to overcome the difficulties outlined above? I can see at least two avenues for future research: one possibility is to obtain solutions for the level of consumption by numerical methods; the other is to base one's approach on approximations.

Numerical methods are not easy and the price to obtain these solutions might be very high. Several studies of dynamic optimisation with discrete choices have shown that these problems can be extremely difficult to solve. General problems with continuous and discrete choices prove quite difficult. One possibility is to make the problem simpler by means of very strong assumptions.[14] While this approach obviously makes the model less realistic, it is potentially quite useful. In particular, it opens an entirely new way of testing the life-cycle model. In a recent study (Attanasio, Banks, Meghir and Weber, 1995), my co-authors and I have

[14]See, for instance, Deaton (1991) and, in particular, Hubbard, Skinner and Zeldes (1995).

simulated a relatively simple life-cycle model using the parameters estimated by the Euler equation approach. We allow utility to depend on family composition. This simple twist of the model is not only not rejected by the data used to estimate the model, but is also able to explain the different shapes of the consumption–age profile for different groups in the population defined on the basis of the educational attainment of the household head. The result is remarkable because there is nothing in the estimation procedure that fits that aspect of the data.

The version of the model we simulate makes a number of very crude assumptions. Some are quite simple to relax. Others are extremely difficult. Much more research in this direction is needed and is being carried out.

The alternative to numerical methods is what I loosely refer to as approximation. The main problem with the structural model I discussed above is the unobservability of the marginal utility of wealth. In general, it is not even possible to derive a closed form solution for such a variable, let alone measure it. However, it is conceivable to devise approximations to it. It is likely that the marginal utility of wealth (and therefore consumption itself, as well as labour supply and other endogenous variables) depends on a set of observable variables as well as on expectations of future variables. These variables could include things such as wages, tax rates, interest rates and demographic variables. One can imagine modelling the main features of the probability distribution of these variables and of their evolution over time. These parameters could then be estimated using flexible functional forms and available data. One can then assume them to be the determinants of the marginal utility of wealth. The Euler equations and the intratemporal first-order conditions could then be used to impose restrictions across equations on the way the approximation to the marginal utility of consumption affects several decision variables. Some of these restrictions will be over-identifying and therefore could be used to test the specification of the model. It should be clear, however, that such a test would always be a joint test of the general model and of the particular approximation to the marginal utility of consumption chosen.

Having constructed approximations to the marginal utility of wealth and what in effect is a ‘consumption function’ (or ‘saving function’), one can use these estimates to evaluate the results of observed changes in the determinants of consumption (from wages to demographics) on individual and aggregate trends. The ultimate objective of this line of research is to perform counterfactuals.

I have started looking at these problems with some of my colleagues at UCL, IFS and elsewhere. There are several issues to be solved. Modelling individual perceptions of future variables is an intrinsically difficult exercise which involves taking a stand on how people learn in situations that are relatively new and continuously changing. It also involves the efficient use of available data to forecast future variables. If one assumes that the consumption choices of a couple aged 30 today depend on the expected pattern of family composition and labour market opportunities, one has to model these expected values using the available

data. One possibility could be to use, in some flexible way, the rate of growth in family size (or wages) of different generations at several ages to approximate the future rate of growth for my 30-year-old individuals.

There are several other directions in which the research of individual consumption and saving behaviour should be expanded. For instance, expenditure on durable commodities is by far the most volatile component of consumption and, at the same time, the hardest to model. Durables are difficult because they last for more than one period, because often their purchase or sale involves transaction costs and because they can sometimes be used as collateral for obtaining loans. All these are features that are hard to model explicitly and yet important.

The assumption that the decision unit is the household is also questionable. There is now some work being done on intra-household allocation of resources which promises some interesting developments.

I want to conclude this brief discussion of theoretical models with a few words about alternative theories of consumption and saving behaviour. There has been a renewed interest among economists in models that stress psychological rather than economic aspects of behaviour. In particular, several people have used various forms of 'mental accounting' to explain saving behaviour. Opinions about the usefulness of these models are quite diverse among economists. Some researchers think that we should scrap the life-cycle model and use these alternative models, while others disagree. From my remarks, it should be clear that I prefer the use of some version of the life-cycle model. This does not mean that I think that the model provides a complete description of human behaviour. Models are not supposed to be complete pictures of the world, but only approximations that emphasise some important aspects of reality that might be obscured or not completely evident. This is one of the reasons we always consider a term in our econometric equations that captures what we call 'unobserved heterogeneity'. I also think that economists can learn a lot from psychologists, especially in some areas, such as the attitudes towards risk, which are extremely important in many models of saving.

My main problem with some of the studies in this area is the reluctance to provide falsifiable restrictions and to use individual data to test them. By saying that people behave irrationally and follow fads which, in turn, can be almost anything, one can rationalise any observation without learning anything useful. Furthermore, some papers have a tendency to stress anecdotal evidence rather than rigorous econometric analysis, which I find frustrating.

III. FACTS AND HYPOTHESES

I want now to turn to some evidence derived from microeconomic data on consumption and saving behaviour. Obviously I will not offer a complete explanation for the aggregate trends I mentioned at the beginning of my lecture. However, I would like to provide an example of how the use of individual

household data and some elements of the theoretical models I discussed can be used to explain some aggregate trends and fluctuations.

The problems one has to solve are tremendous and range from some serious conceptual issues about identification to problems of data quality and compatibility. Given the nature of this lecture, I will have to skip a careful discussion of these issues which, however, have been discussed elsewhere.[15]

I will start with some simple pictures that illustrate the consumption behaviour of individuals in the UK and the US. The data analysed come from two large surveys — the Family Expenditure Survey (FES) in the UK and the Consumer Expenditure Survey (CEX) in the US. These surveys are invaluable sources of information for anybody interested in studying consumption behaviour. Neither of the surveys is a true panel: each household is interviewed only once in the UK and only four times in the US. This poses a problem if we want to follow the behaviour of individuals over time. In the rest of this talk, I will use a technique that was first proposed in a famous paper by Browning, Deaton and Irish (1985). This consists of following homogeneous groups of individuals over time. Given that I cannot follow the same individual over time, I can track the average consumption (or income, or any other variable) of the individuals born in the same time interval. This procedure will allow me to follow the average life-cycle behaviour of different cohorts.

Figure 5 plots average consumption behaviour against age in the UK and the US. Each connected segment represents the average consumption of a cohort of individuals observed at different points in time. Each cohort is observed, depending on its year of birth, over different intervals of ages. The pictures present some similarities and some differences. Both profiles have a characteristic 'hump' shape. They peak roughly at the same age, the UK slightly earlier than the US, at age 45. One could divide the sample not only in birth cohorts, but also according to some other criterion, such as the educational attainment of the household head or the region of residence. When one does that, it is evident that there are strong differences not only in the levels but also in the life-cycle shape of these profiles, especially across education groups.

[15]See Johnson and McCrae (1996) and Tanner (1996).

FIGURE 5

Log of Total Household Consumption Expenditure

Sources: Family Expenditure Survey; Consumer Expenditure Survey.

What we call 'cohort effects' (i.e. the difference in the life-cycle profiles of different year-of-birth cohorts) are quite evident in both graphs. The presence of these effects, probably due to differences in life-cycle wealth across cohorts, make it important to use time series of cross-sections (rather than a single cross-section) to study life-cycle profiles.

The most striking difference between the UK and the US is the rate of decline of consumption after retirement, which is much stronger in the UK than in the US: from peak to age 70, household consumption in the UK declines by roughly 60 per cent, while in the US it declines by roughly 33 per cent. As I have already said, understanding the decline in consumption after retirement is crucial when addressing the issue of the adequacy of current saving. One possibility is that the observed decline in consumption is due to the realisation that retirement savings are not enough to maintain a certain level of consumption. An alternative explanation is that the decline is due to a change in preferences connected with the radical change in labour market status and possibly with changes in family composition and health status. Banks, Blundell and Tanner (1996) show that two-thirds of the decline observed in the UK can be accounted for by an optimisation model. It would be interesting to conduct a similar study for the US. It would also be interesting to check how expenditure patterns change after retirement.

There are a number of possibly obvious explanations for the difference between the US and the UK: one possibility is that there are differences in the definition of consumption; another that family size varies systematically between the two countries. Figure 6 therefore plots the log of non-durable consumption divided by the number of adult equivalents in the household. This should make the

FIGURE 6

Log of Non-Durable Consumption: Household and Per Adult Equivalent

Sources: Family Expenditure Survey; Consumer Expenditure Survey.

two pictures more comparable. While this exercise does make the two profiles more similar, there are still remarkable differences: the US profile declines by 25 per cent while that for the UK declines by over 40 per cent.

If we are interested in personal savings, from an accounting point of view, the other important variable, in addition to expenditure, is disposable income, whose log is plotted in Figure 7. Putting things together, we can now plot average saving rates in Figure 8: the faster decline in UK consumption growth is reflected in a continuously increasing profile for saving rates in the UK; in the US, there seems to be a marked tendency for the saving rate to decline in the last part of life.

I have stressed how the patterns of several economic variables have changed in an important fashion. I have shown some evidence on female labour supply behaviour. Average family size has decreased considerably over the past two decades.

What are the effects of all these variables on saving? In my theoretical remarks, I have stressed that, without a structural model, it is not in general possible to address this issue. Consider, for instance, female labour supply. There are several reasons why it can affect saving. First of all, one could think that when a woman participates in the labour force, a number of services that would normally be performed by her have to be, at least in part, substituted with commodities and services purchased on the market. This implies that the measure of saving normally used would decline. The reason for this is that the income of households in which the woman does not participate in the labour

FIGURE 7

Log of Disposable Income

Sources: Family Expenditure Survey; Consumer Expenditure Survey.

FIGURE 8

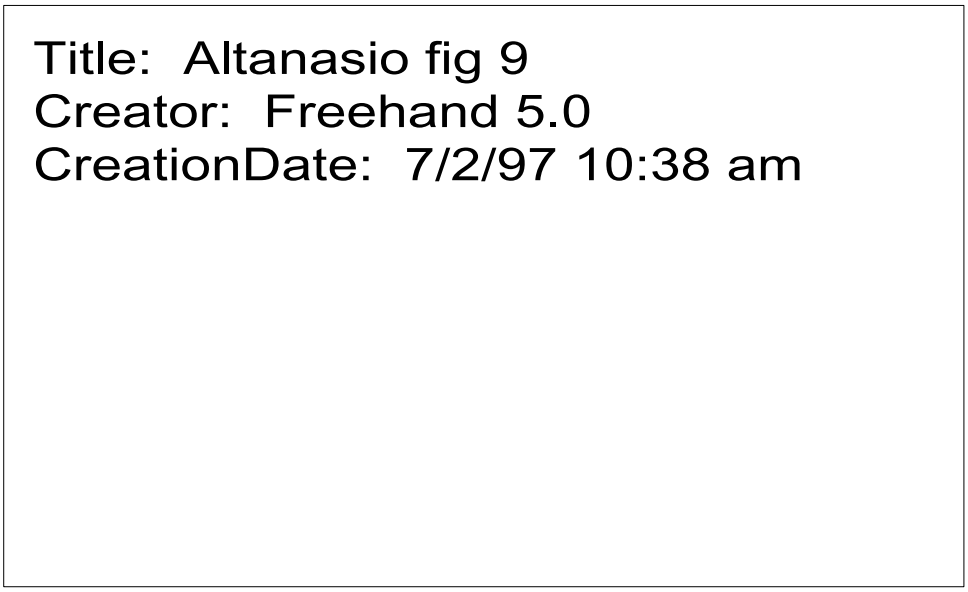
Household Saving Rates

Sources: Family Expenditure Survey; Consumer Expenditure Survey.

force should include the income produced by her at home. In addition to this simple effect, it is likely that female labour force participation will reduce the overall variability of household income, especially if the latter is linked to unemployment risk. In the presence of a precautionary motive, this effect should reduce personal saving. Furthermore, if males and females have different incentives to save, a greater share of family income earned by the female might change the overall incentives to save. Even without considering the intra-household decision process, only under very special circumstances can saving and labour

FIGURE 9

Female Labour Force Participation and Saving Rates across Countries



Source: OECD.

supply decisions be considered independently. In a recent study (Attanasio and MaCurdy, 1996), Tom MaCurdy and I have shown that considering male and female labour supply and consumption decisions separately can be very misleading.

Simple correlations between saving and labour supply decisions are not enough, but might be indicative. If one plots saving rates for a group of countries against female participation rates in the labour force averaged over a long time period, as in Figure 9, one gets a striking negative correlation. Furthermore, if one regresses saving rates at the cohort level over a number of controls (such as a polynomial in age and cohort dummies) and the total number of hours worked by the wife, one gets a negative and significant correlation. While this evidence is suggestive, one needs a more structural approach to the problem.

While I am convinced that structural estimation is essential to construct counterfactuals and to test several explanations of the observed aggregate trends, I also think that an informed analysis of the data can be quite suggestive and useful. I want to conclude my lecture with two simple exercises that show how good micro-datasets and a simple structural model in the background can be used to suggest explanations of the observed trends. The two empirical facts I will be looking at are the precipitous collapse in the aggregate saving rate in the US

FIGURE 10

The UK Consumption Boom and Bust: 1987–92

Sources: Family Expenditure Survey; author's computations.

during the period covered by my microeconomic sample (1980–92), and the seven years from 1986 to 1992 in the UK, during which the personal saving rate declined and then rebounded to reach a high level at the end of the sample.

I will start with the UK episode, on which I have written a few years ago, when data up to 1988 were available. The 1987–88 consumption boom in the UK has attracted a considerable amount of attention from many people. Several explanations have been offered. In Attanasio and Weber (1994), Guglielmo Weber and I suggested that the most plausible was that of an increase in perceived lifetime wealth, especially by young generations and especially in those sectors of society that enjoyed the rapid growth of those years. Our argument was based on a picture similar to that reported in Figure 10.

In this figure, for each of four widely-defined regions of the UK, I have estimated, using data from 1968 to 1985, a consumption–age profile for non-durable consumption for several cohorts. A similar picture can be derived for total expenditure. I then plot, on the same graph, using crosses as points, the average cohort data for the years following 1985. As we can see, most of the action happened in the South-East and the wide region that includes the Midlands, East Anglia and the South-West ('rest of England'). What is most striking, however, is that during the consumption boom, it was mainly the youngest cohort which

increased its consumption above the estimated profile. We interpreted that evidence as indicating that there was a change in expectations about future income growth that caused especially the youngest cohort, which would benefit most from such a change, to revise its consumption plans.

One of the main alternative hypotheses was that the consumption boom was caused by consumers using the deregulated financial markets to cash in on the capital gains on real estate during those years. Our explanation does not necessarily exclude the possibility that some of this happened. Indeed, if in a micro-regression we control for changes in house prices at the regional level interacted with home-ownership dummies, these effects are significant. The problem is that they cannot explain the deviations from the estimated profiles for the youngest cohorts. They do a good job at explaining the deviations for the older cohorts (with a much higher rate of home-ownership), but that is probably not enough to explain the aggregate consumption boom.

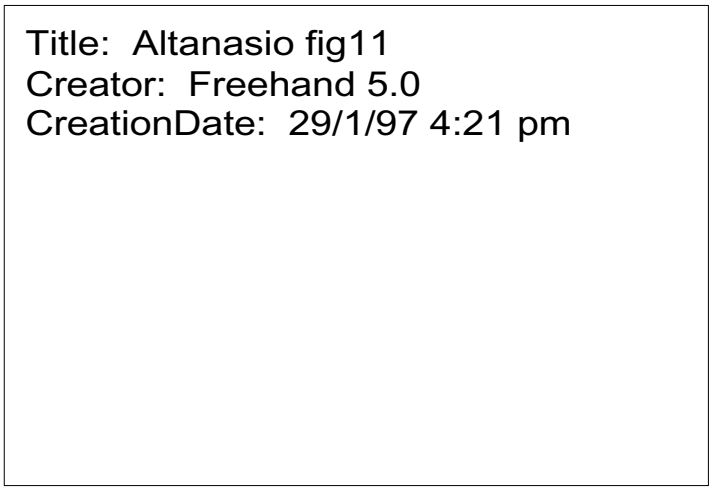
Figure 10 includes data up to 1992. As we can see, there is a reversal in the consumption of those groups that had increased their consumption the most. The optimism of the late 1980s probably proved ungrounded for many of these people. Instead, we find that some of the older groups actually increased their deviations from the estimated profile. Their consumption, however, is already quite low for life-cycle reasons, so that it does not show dramatically in the aggregate statistics.

The second story I want to discuss is about the US. Here I use material from the paper that started with the Marlowe quotation I mentioned at the beginning (Attanasio, 1994). The focus of this exercise is different, as, unfortunately, I do not have the long time series that I have for the UK. The CEX is available on a continuous basis only since 1980. Figure 11 is a smoothed version of Figure 8b, which reported the average saving rates for birth cohorts. It is obtained by regressing the average saving rates on a polynomial in age and cohort dummies. The evidence here seems to indicate two things. First, consistent with the life-cycle model, the life-cycle profile for saving rates seems hump-shaped. Second, there are significant cohort effects over this period. The 'middle cohorts' — the parents of the baby-boom generations — seem to be saving less than the cohorts that preceded them and followed them.

This is a potentially useful explanation of the decline we observed during the 1980s because it identifies a demographic group that might be 'responsible' for the observed decline. Another, maybe less controversial, way to see the same thing is to notice that the average saving rate for each of the middle cohorts is below that of the cohorts that preceded and followed it, *for the ages at which they overlap*. (It is important to notice that they overlap with the young at the beginning of the sample and with the old at the end, so that it would be hard to rationalise these findings with simple time effects.) The reason this shift would be reflected in a decline in aggregate saving rates is that this particular group is observed during their 'peak' years in terms of life-cycle saving. Marlowe's task is mainly to identify 'who did it'. Having succeeded in doing so, we will have to find plausible

FIGURE 11

US Saving Rates (Smoothed)



Source: Consumer Expenditure Survey.

explanations for such a phenomenon. In any case, it is interesting to notice that the baby-boom generation does not seem to be responsible for the decline during the 1980s. During the 1980s, they were still too young to be saving seriously. In addition, their different patterns of female labour force participation and the delay in family formation and in fertility might have substantially changed the life-cycle profile of saving. Without a structural model, we will not be able to answer these questions.

IV. CONCLUSIONS

In this lecture, I have stressed several times the difficulties of a rigorous analysis of consumption and saving behaviour. The structural models we can handle and estimate are often too simple to give a satisfactory answer to the most interesting questions. On the other hand, I am convinced that a purely descriptive analysis is not enough to provide these answers. It is this fundamental tension between structural models and descriptive analysis that will have to be resolved to make substantial progress in our understanding of saving behaviour and in the analysis of policy issues related to it. We have in front of us an exciting research agenda.

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